

Configuring a terminal may comprise scheduling downlink and/or uplink transmissions for the terminal, e.g. downlink data and/or downlink control signaling and/or DCI and/or uplink signaling, in particular acknowledgement signaling, and/or configuring resources and/or a resource pool therefor.

In this disclosure, for purposes of explanation and not limitation, specific details are set forth (such as particular network functions, processes and signaling steps) in order to provide a thorough understanding of the technique presented herein. It will be apparent to one skilled in the art that the present concepts and aspects may be practiced in other variants and variants that depart from these specific details.

For example, the concepts and variants are partially described in the context of Long Term Evolution (LTE) or LTE-Advanced (LTE-A) or Next Radio mobile or wireless communications technologies; however, this does not rule out the use of the present concepts and aspects in connection with additional or alternative mobile communication technologies such as the Global System for Mobile Communications (GSM). While the following variants will partially be described with respect to certain Technical Specifications (TSs) of the Third Generation Partnership Project (3GPP), it will be appreciated that the present concepts and aspects could also be realized in connection with different Performance Management (PM) specifications.

Moreover, those skilled in the art will appreciate that the services, functions and steps explained herein may be implemented using software functioning in conjunction with a programmed microprocessor, or using an Application Specific Integrated Circuit (ASIC), a Digital Signal Processor (DSP), a Field Programmable Gate Array (FPGA) or general purpose computer. It will also be appreciated that while the variants described herein are elucidated in the context of methods and devices, the concepts and aspects presented herein may also be embodied in a program product as well as in a system comprising control circuitry, e.g. a computer processor and a memory coupled to the processor, wherein the memory is encoded with one or more programs or program products that execute the services, functions and steps disclosed herein.

It is believed that the advantages of the aspects and variants presented herein will be fully understood from the foregoing description, and it will be apparent that various changes may be made in the form, constructions and arrangement of the exemplary aspects thereof without departing from the scope of the concepts and aspects described herein or without sacrificing all of its advantageous effects. The aspects presented herein can be varied in many ways.

Some useful abbreviations comprise:

Abbreviation	Explanation
ACK	Acknowledgment
ARI	ACK/NACK Resource Indicator
CCE	Control Channel Element
DCI	Downlink Control Information
DL	Downlink
DTX	Discontinues Transmission
HARQ	Hybrid Automatic Repeat Request
MIMO	Multiple Input Multiple Output
NACK	Negative Acknowledgment
PAPR	Peak to Average Power Ratio
PDCCH	Physical Downlink Control Channel
PUCCH	Physical Uplink Control Channel
RRC	Radio Resource Control
UL	Uplink

What is claimed is:

1. A method of operating a User Equipment, UE, in a New Radio, NR, Radio Access Network, the method comprising: transmitting Hybrid Automatic Repeat Request, HARQ, feedback pertaining to downlink data transmitted on a Physical Downlink Shared Channel, PDSCH, the downlink data comprising at least one downlink data element, the HARQ feedback having an uplink signaling format comprising at least one acknowledgement substructure, each of the substructures carrying acknowledgement information pertaining to a downlink data element, each of the acknowledgment substructures being mapped to a different of the downlink data elements based on at least one acknowledgement position indication provided in downlink control signaling received by the UE;

the acknowledgment position indication comprising a timing indication, the timing indication comprising a timing bit pattern of more than one bit explicitly indicating a slot for transmitting the HARQ feedback, the slot comprising at least 14 symbol time intervals; the acknowledgement position indication further comprising a resource selection indication comprising a resource bit pattern, the resource bit pattern comprising more than one bit explicitly indicating a Physical Uplink Control Channel, PUCCH, resource for transmitting the HARQ feedback, the resource bit pattern being separate from the timing bit pattern; and the PUCCH resource being a time-frequency resource and being selected by the resource selection indication from a pool of resources configured to the UE to be available for transmitting the HARQ feedback in the slot indicated by the timing indication.

2. The method according to claim 1, wherein the acknowledgement position indication is selective between at least two different uplink signaling formats.

3. The method according to claim 1, wherein the downlink control signaling comprises at least one message, wherein each message comprises at least one acknowledgement position indication.

4. The method according to claim 1, wherein the downlink control signaling comprises at least one message, each message representing at least one from a group consisting of a scheduling assignment and a Downlink Control Information, DCI, message.

5. The method according to claim 1, wherein the downlink data elements comprise at least one from a group consisting of transport blocks and code block groups.

6. The method according to claim 1, wherein resources of the configured pool of resources the PUCCH resource for transmitting the HARQ feedback are selected from have one of different associated format for transmission of the HARQ feedback and different payload size.

7. A user equipment for a New Radio, NR, Radio Access Network, the user equipment comprising:

processing circuitry and being configured to utilize the processing circuitry to transmit Hybrid Automatic Repeat Request, HARQ, feedback pertaining to downlink data transmitted on a Physical Downlink Shared Channel, PDSCH, the downlink data comprising at least one downlink data element, the HARQ feedback having an uplink signaling format comprising at least one acknowledgement substructures, each of the substructures carrying acknowledgement information pertaining to a downlink data element, each of the acknowledgment substructures being mapped to a different of the downlink data elements based on at least